

---

WHAT IS CLAIMED IS:

1. A method for manufacturing a liquid discharge heads provided with:
  - a discharge port for discharging liquid;
  - 5 a liquid flow path communicated with said discharge port for supplying liquid to said discharge port;
  - a substrate having ~~a heat generating members for creating a bubble in liquid; and~~
  - 10 a movable member facing said heat generating members, being arranged in said liquid flow path, and having a free end on said discharge port side with a specific gap with said heat generating member, comprising the following steps of:
    - 15 forming a boundary layer used for providing a gap between said movable member and said substrate above said heat generating member on said substrate;
    - laminating said movable member on said boundary layer so as to position said free end above said heat generating member and fixing said movable member on said substrate; and
    - 20 forming said gap between said movable member and said heat generating member by use of said boundary layer.
- 25 2. A method for manufacturing a liquid discharge head according to Claim 1, wherein said boundary layer

is provided with a releasable layer having not superior adhesiveness with said movable member, and said movable member is separated from said releasable layer by the stress exerted by said movable member for the formation 5 of said gap.

3. A method for manufacturing liquid discharge heads according to Claim 1, wherein said boundary layer is formed by material selectively removable with respect to said movable member, and said gap is formed 10 by removing the boundary layer residing above said heat generating member.

4. A method for manufacturing liquid discharge heads according to Claim 1, wherein said movable member 15 is fixed to said substrate by means of the pedestal portion provided for said substrate.

5. A method for manufacturing liquid discharge heads according to Claim 4, wherein said movable member 20 is fixed to said substrate by bonding said movable member and said pedestal portion.

6. A method for manufacturing liquid discharge heads according to Claim 3, wherein said boundary layer 25 is formed by fusible material layer, and said boundary layer is heated to be fused for the removal of said

boundary layer.

7. A method for manufacturing liquid discharge heads according to Claim 1, wherein said movable member  
5 is formed by electroformation on said substrate.

8. A method for manufacturing liquid discharge heads according to Claim 7, wherein said boundary layer  
is formed by conductive material.  
10

9. A method for manufacturing liquid discharge heads according to Claim 4, wherein said movable member  
is joined to the substrate through said boundary layer,  
and the remaining portion of the boundary layer after  
15 removal becomes said pedestal portion.

10. A method for manufacturing liquid discharge heads according to Claim 3, wherein said step of  
forming said movable member is performed by patterning  
20 after the material layer becoming the movable member is  
filmed on said substrate.

11. A method for manufacturing liquid discharge heads according to Claim 1, wherein said movable member  
25 is fixed to said substrate by laminating the movable  
member on the portion of said substrate being exposed  
from said boundary layer.

12. A method for manufacturing liquid discharge heads according to Claim 1, wherein said movable member is formed by metal.

5 13. A method for manufacturing liquid discharge heads according to Claim 12, wherein said metal is gold or nickel.

10 14. A method for manufacturing liquid discharge heads according to ~~Claim 7~~, wherein said pedestal portion is formed by metal.

15 15. A method for manufacturing liquid discharge heads according to Claim 14, wherein said metal is lead or gold.

16. A method for manufacturing liquid discharge heads according to Claim 10, wherein said material layer becoming said movable member is formed by either one of silicon nitride, diamond, amorphous carbon hydride, and silicon oxide.

25 17. A method for manufacturing liquid discharge heads according to Claim 1, wherein said boundary layer is a releasable layer having not superior adhesiveness with said movable member, and said movable member is separated from said releasable layer by the provision

of heating, ultrasonic waves or vibrations or plural of them to form said gap.

18. A method for manufacturing liquid discharge heads according to Claim 1, wherein the surface area of said movable member is formed to be larger on the reverse side of said surface than the surface on said heat generating member side.

10           19. A liquid discharge head, comprising:  
               a plurality of discharge ports for discharging  
               liquid;  
               a plurality of liquid flow paths communicated with  
               each of said discharge ports to supply liquid to each  
               15        of said discharge ports;  
               a substrate provided with heat generating members  
               for creating a bubble in liquid;  
               a movable member arranged in each of said plural  
               liquid flow paths, the movable member having a free end  
               20        on said discharge port side to face said heat  
               generating member; and  
               a pedestal portion formed on said substrate for  
               supporting said movable member,  
               said movable member having property of being  
               25        curved by heat, and the portion corresponding to the  
               movable range being separated by heating from said  
               substrate.

A

Suek  
B2

Xerox

20. A liquid discharge head, comprising:

a plurality of discharge ports for discharging liquid;

5 a plurality of liquid flow paths communicated with each of said discharge ports to supply liquid to each of said discharge ports;

a substrate provided with heat generating members for creating a bubble in liquid;

10 a movable member arranged in each of said plural liquid flow paths, each having the free end on said discharge port side to face said heat generating member; and

a pedestal portion formed on said substrate for supporting said movable member,

15 the portion of said movable member corresponding to the movable range being separated from said substrate by means of the inner stress and the function of the releasable layer formed on said substrate.

20. A liquid discharge head, comprising:

a plurality of discharge ports for discharging liquid;

a plurality of liquid flow paths communicated with each of said discharge ports to supply liquid to each of said discharge ports;

25 a substrate provided with a heat generating member for creating a bubble in liquid;

*✓ 6/22/02*

a movable member arranged in said plural liquid flow paths, the movable member having a free end on said discharge port side to face said heat generating member; and

5 a pedestal portion formed on said substrate for supporting said movable member,

the portion of said movable member corresponding to the movable range being provided with a recessed part on the portion adjacent to said pedestal portion.

10

22. A liquid discharge head, comprising:

a discharge port for discharging liquid;

a liquid flow path communicated with each of said discharge ports to supply liquid to each of said discharge port;

15 a substrate provided with heat generating members for creating a bubble in liquid; and

a movable member arranged in said plural liquid flow paths, the movable member having a free end on said discharge port side to face said heat generating member, and said free end being positioned on the downstream of the area center of said heat generating member,

20 said movable member being formed either one of silicon nitride, diamond, amorphous carbon hydride, and silicon oxide, and being incorporated on said substrate.

*Spec B5 cont*

23. A liquid discharge head according to Claim 22, wherein said movable member is formed by silicon nitride with impurities being added thereto.

5 24. A liquid discharge head according to Claim 22, wherein said movable member is formed by a silicon nitride multi-layered film with the compositions being changed or impurities being added thereto.

10 25. A substrate for use of a liquid discharge head provided with a heat generating member for creating a bubble in liquid; a cantilever type movable member arranged to face said heat generating member with a specific gap therebetween,

15 said movable member being formed either one of silicon nitride, diamond, amorphous carbon hydride, and silicon oxide, and being incorporated on said substrate.

20 26. A substrate for use of a liquid discharge head according to Claim 25, wherein said movable member is formed by silicon nitride having impurities being added thereto.

25 27. A substrate for use of a liquid discharge head according to Claim 25, wherein said movable member is formed by a silicon nitride multi-layered film with

- 61 -

*Sub  
B2  
concl*

the compositions being changed or impurities being added thereto.

5

10